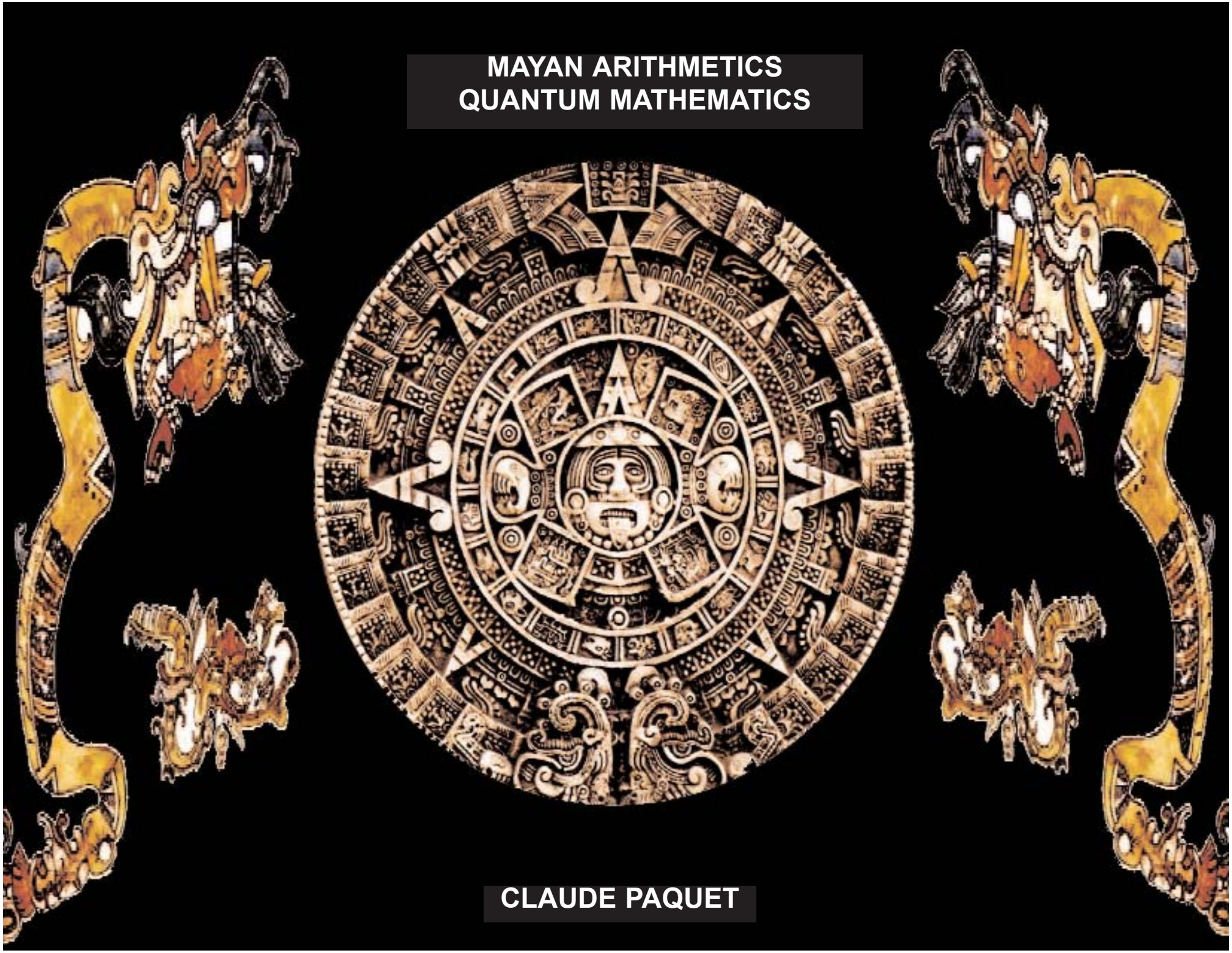
MAYAN ARITHMETICS
QUANTUM MATHEMATICS



CLAUDE PAQUET

MAYAN MATHEMATICS
TO QUANTUM EQUATIONS

From our distant origins, the interpretation of the ancient world has always been associated with shamanism through artistic expression. (Singing, dancing, drawing) According to R. Hamayon , the shaman's visions are not spontaneous physiological phenomena, but cultural and symbolic manifestations specific to the time of their expression. David S. Whitley , of the University of Los Angeles, established that the Native American shamans drew on the walls the visions which had appeared to them during their "dreams". His contact with the spirits gives the shaman special powers. The levels of the shamanic cosmos are accessible to shamans as they explore their altered states of consciousness to fulfill their various tasks. Access to their path of exploration is what anthropologists call "axis mundi ." These insights gained in altered states of consciousness become raw material for potential cultural use. In the past, in some communities, shamans recounted their experiences in tales, songs and myths; sometimes they paint them on perishable materials like drum skins and clothing or on rock faces.

The conditions in which man lives force him to perceive a certain amount of visual phenomena that are very specific to his environment, both intellectual and physical. These visual assets are real symbioses of cultural habits and customs, scientific knowledge, optical laws and perceptual intuitions, religious beliefs and even mythical illusions of a given society at a specific time. As Riches rightly said, the shaman is "creator of cosmology", that inherent in his time.

This is the case with the mathematics and astrology of the Mayas. Both reflect the degree of knowledge of their civilization. cosmology and religion.

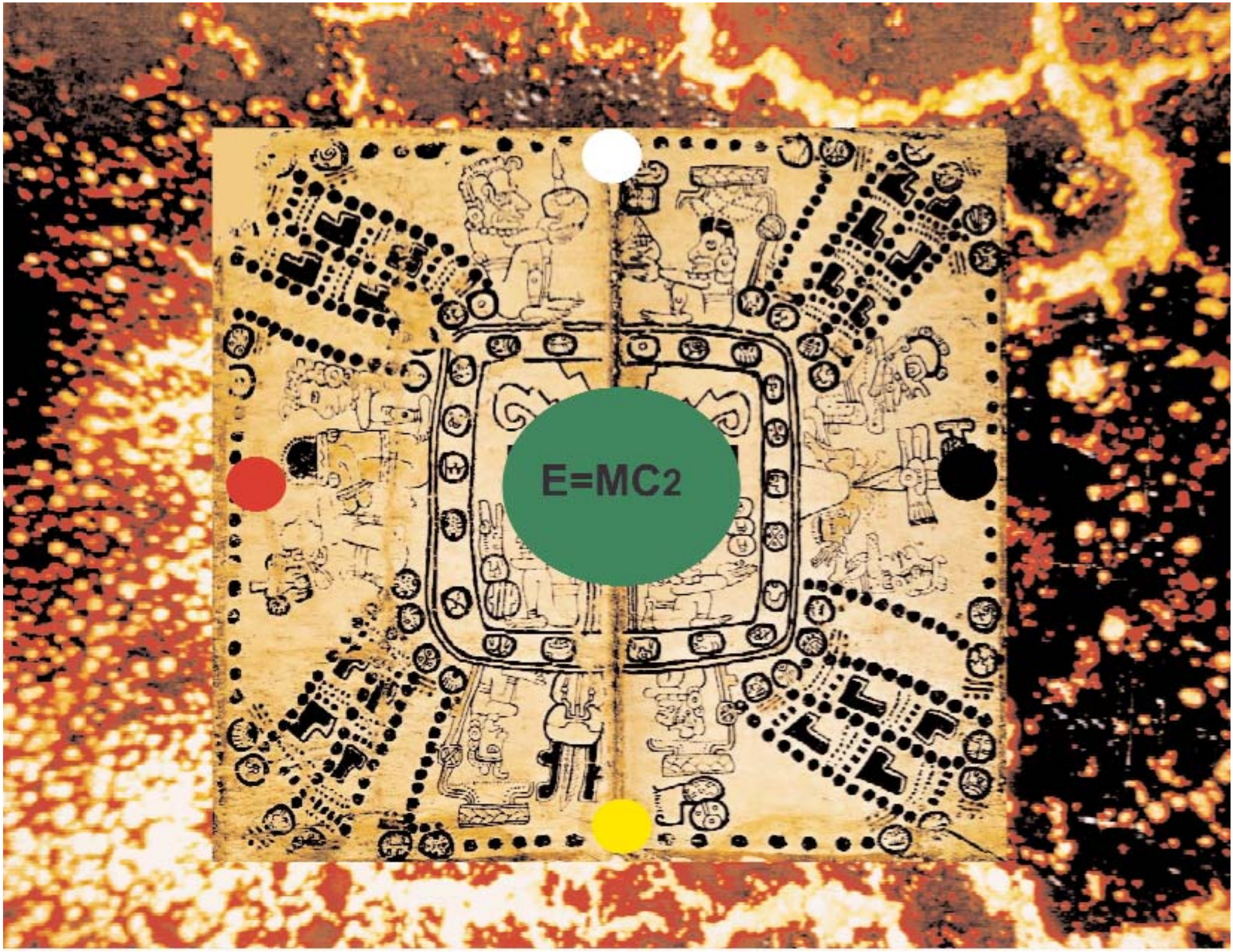
The Mayans believed in the recurrence of cycles of creation and destruction and for them the eras lasted, according to our modern system of computation of time, some 5200 years. The current cycle would have started in 3113 or 3114 BC. of our calendar.

It is not easy, from the knowledge we have today of the Maya civilization, to interpret their cosmology. It seems obvious, however, that the Maya saw the Earth as a flat, square shape. Each of its four angles was located at a cardinal point and was represented by a color: red in the east, white in the north, black in the west and yellow in the south. The center was green.

Some Maya also believed that the sky was stratified and that each of its four angles was supported by a deity of impressive musculature called " Bacab ". For others, the sky was held up by four trees of different colors and species, and the green ceiba , or liard, stood in the center.

For the Maya, the flattened shape of the Earth represented the back of a giant crocodile resting in a pool filled with water lilies. In the sky, the counterpart of the crocodile was a two-headed serpent, a notion no doubt attributable to the fact that the Maya term designating the sky resembles the word serpent. In hieroglyphic characters, the body of the sky serpent is represented not only by its own sign - crossed bars - but also by those of the Sun, Moon, Venus and other celestial bodies.

The image of the human face emerging from the jaws of the serpent is a frequent theme in Maya art. On the other hand, in this case, the sculpture of the snake covered with feathers is a later (Toltec) addition to the geometric design of the Maya mosaic. The image is part of a complicated frieze on the western facade of the "Convent", in Uxmal.

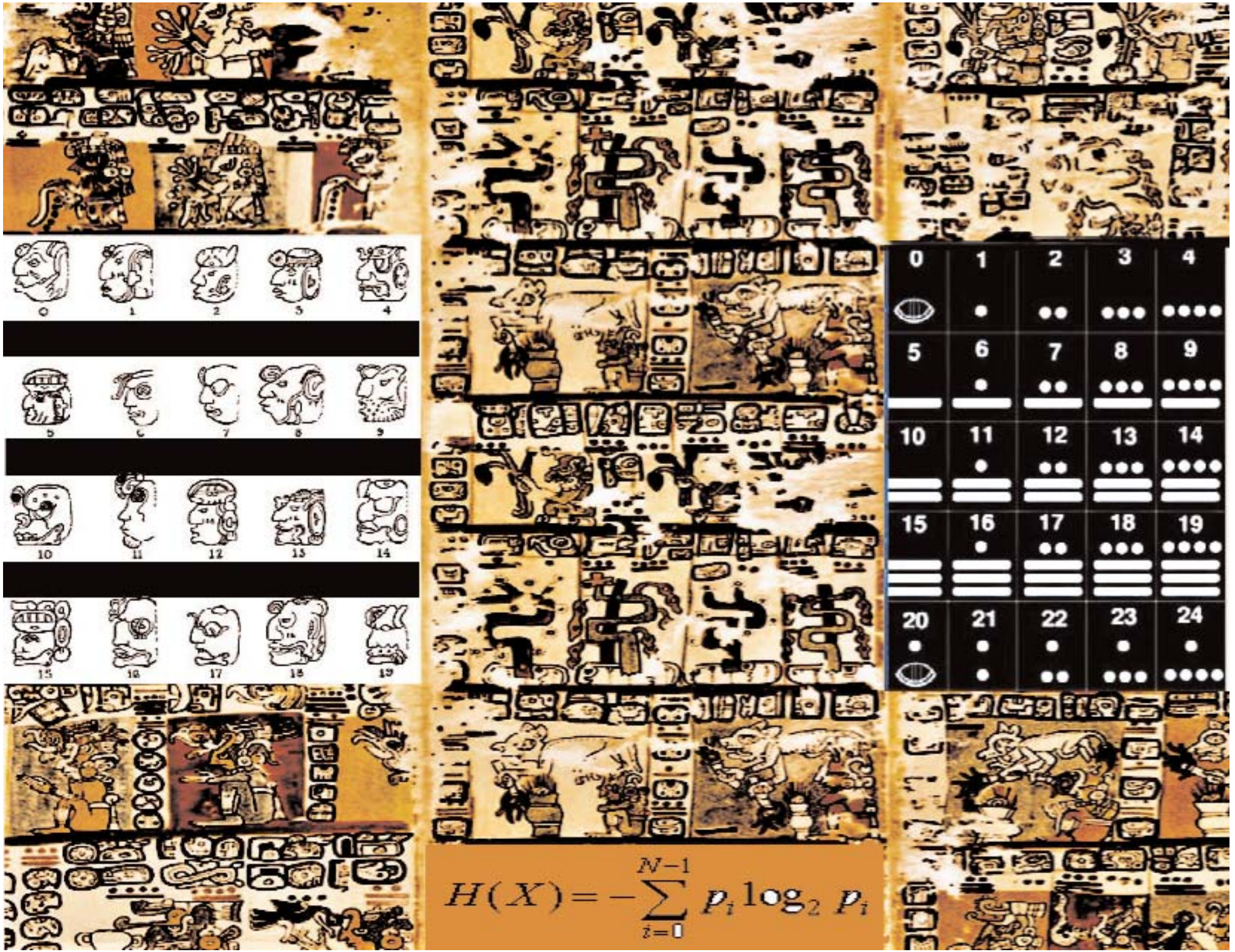

E=MC2

The sky was made up of 13 strata, each with its own deity. At the highest level was the muan bird , a kind of owl. The underworld had nine strata over which ruled nine lords of the night. The underworld was a cold and inhospitable place to which most Maya were destined after death. This subterranean universe also welcomed celestial bodies such as the Sun, the Moon and Venus every evening, once they crossed the threshold of the horizon.

Very little is known about the Mayan pantheon. It contained an incalculable number of deities of which at least 166 bear a name. This proliferation is partly explained by the fact that each of the deities appeared under multiple aspects. Some had more than one gender, others could be both young and old. Each god representing a celestial body had a different face in the underworld which revealed itself each evening at its "death". Some Maya sources also mention a single supreme god, called Itzamná , author of writing and patron of the arts and sciences. His consort, Ix Chel , was the goddess of weaving, medicine, and childbirth and the ancient moon goddess.

The Mayan priests were not celibate and their sons often succeeded them. The role of the priests was closely linked to the calendar and to astronomy. They controlled learning and rituals and they were responsible for the computation of time, festivals, ceremonies, fateful days and seasons, divination, events, treatment of illnesses, writing and genealogies. .

All Mayan rituals were dictated by the sacred cycle calendar of 260 days and all demonstrations had symbolic significance. Abstinence from sex was strictly observed before and during these events and self-mutilation was commonly practiced to provide the blood with which religious articles were blessed by anointing. The elite were obsessed with blood - their own and that of the prisoners - and the rite of bloodletting was an important aspect of any major event in the Mayan calendar. Bloodletting was also used to conciliate the gods and at the beginning of the decline of the Maya civilization, the chiefs who possessed vast territories ran, it was said, from one city to another to practice this rite to save their kingdom in the process of perdition.


0 1 2 3 4
5 6 7 8 9
10 11 12 13 14
15 16 17 18 19
20 21 22 23 24
$$H(X) = -\sum_{i=0}^{N-1} p_i \log_2 p_i$$

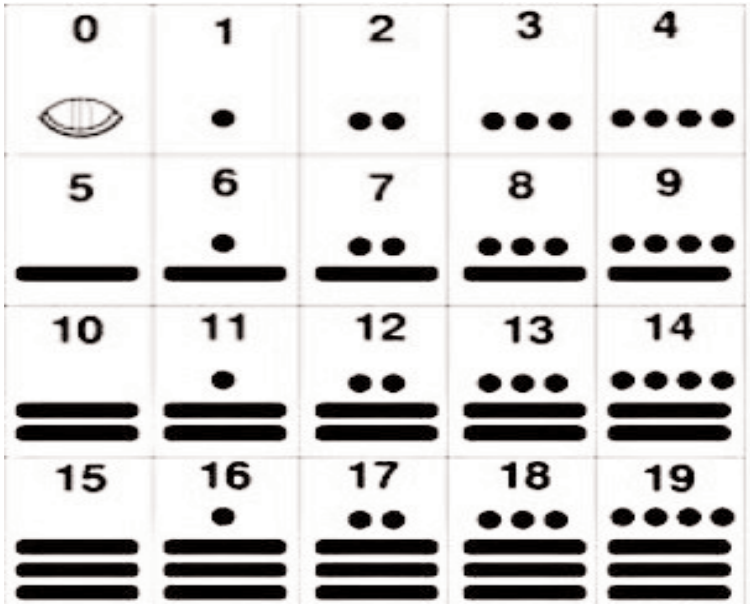
Aritmetic

Note that the equations have been considered for their aesthetic value in the general iconography of the document

The mathematical system of the Mayas was the most perfected of the systems in America. The calculation was carried out using only three symbols: the point represented the unit, the bar, the number five and the shell, the zero. The Maya used various combinations of these three symbols to enable even uneducated people to perform the simple calculations they needed in the exercise of their profession or for their trade, and also to record, in their calendar, past and future events. They had also understood the value of zero, a remarkable achievement compared to other civilizations of the world which had not yet discovered this concept at the time. The Maya used the vicesimal system for their numbering - a system based on the number 20 rather than the number 10. So instead of changing columns to 10, 100, 1000 and then 10,000, as we do, the Mayans went from 1 to 20, to 400, to 8000, then to 160,000.

Mayan numbers, including calendar dates, were superimposed from bottom to top, vertically. The number 3, for example, was represented using three horizontally aligned dots. The number 12 corresponded to two superimposed bars surmounted by two aligned dots, and the 19, to three superimposed bars surmounted by four aligned dots. Digits greater than 19 were represented using the same sequence of symbols, except that a dot was placed above each group of 20. Thus, to denote the digit 32, the symbols for 12 and l were used. a point was added above this sequence representing an additional group of 20 units. This system repeated itself ad infinitum. The set of mathematical symbols allowed even uneducated people to perform addition and subtraction for commercial purposes. To add two digits, the symbols of each of them were arranged side by side and then united into one. Thus, two bars and a dot for the 11 could be added to a bar equivalent to five, which gave three bars superimposed and surmounted by a dot, which is the equivalent of the number 16.

According to the Maya, some figures were more sacred than others because of the special role they played. 20 was one of them, because it was the number of fingers and toes humans could count on. The 5 represented the number of fingers of the hand or the foot and the 13, the total number of deities of the original pantheon. The 52 was also attributed a sacred character since it was the number of years included in a "beam", a unit similar to that of our century. And since there were 400 night gods, this number also had a sacred value. The Maya additionally used the heads of the glyphs as numerical symbols. The number 1, for example, often bears the emblem of a young earth goddess, the 2, that of a sacrificial god, and so on. These symbols are similar to other glyphs representing deities, which did not fail to create some confusion in the decryption, especially since the numeric glyphs were sometimes compounds. The number 13, for example, could appear as a glyph head representing 10 combined with a glyph head for 3. Numerical glyph heads could also be combined with dots, bars, and shells. Arithmetic was a discipline important enough among the Maya to feature in their works of art. On the wall paintings, for example, we recognize the scribes of arithmetic, or the mathematicians, by the numbered manuscripts they carry under their arm. The first of these characters to be identified on a glyph was female.



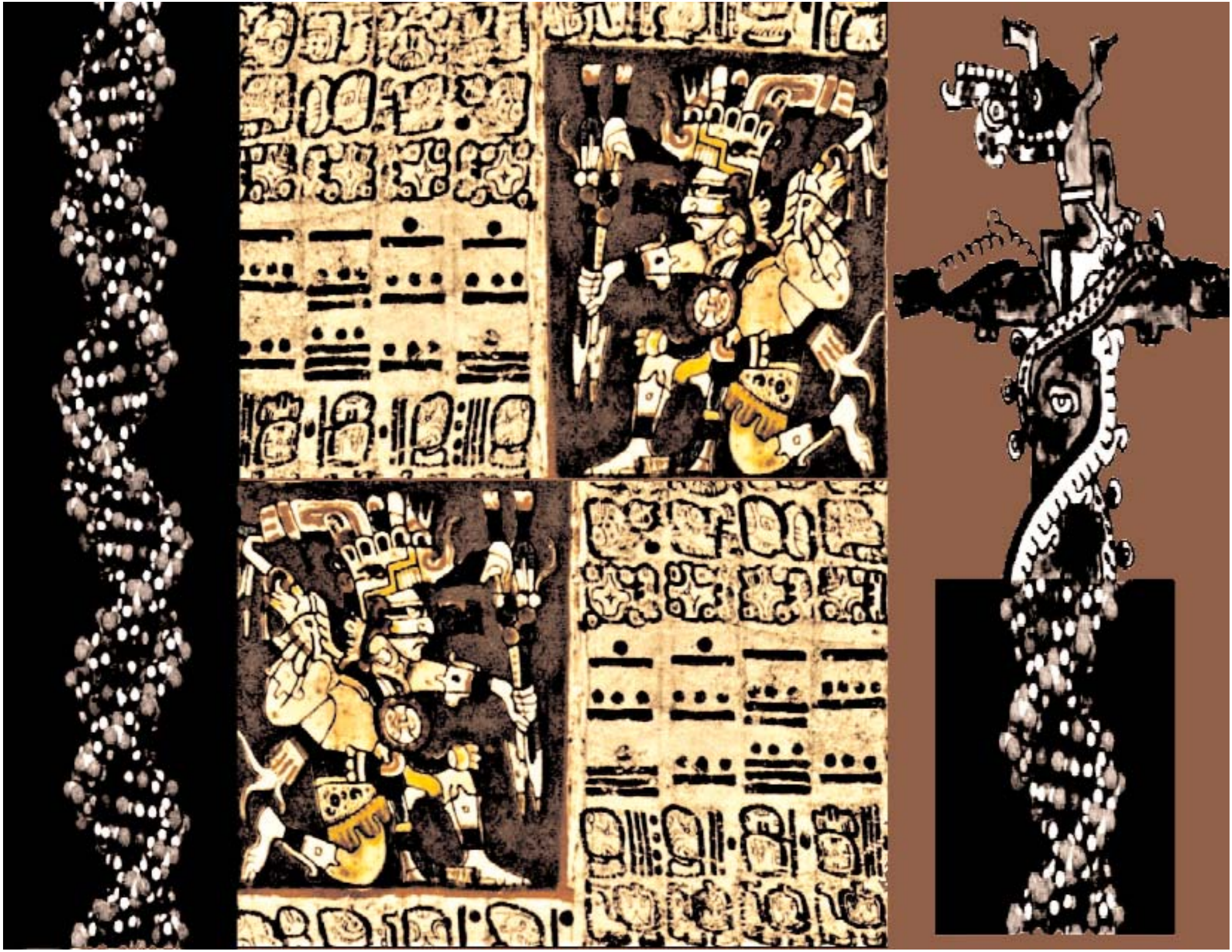
$\frac{e^{-|x|m\xi_0/\hbar\tau}}{\sqrt{2\pi\hbar\tau/m}}\exp\left(\frac{imx^2}{2\hbar\tau}\right)$
$\rho \to \Phi_{\delta t}[\hat{\rho}] = \cos^2(\omega\delta t)\hat{\rho} + \sin^2(\omega\delta t)\hat{\sigma}$
$-i\sin(\omega\delta t)\cos(\omega\delta t)\,[\hat{\sigma},\hat{\rho}]\,.$
$\|\rho(\tau)\| \leq \frac{(\omega\tau)^2}{N}\left(\|\hat{\sigma}\|\right.$
$\sqrt{\frac{\xi_0}{2\pi}}\frac{2\xi_0}{x^2+\xi^2} \equiv \sum_p \sqrt{2\pi\xi}$

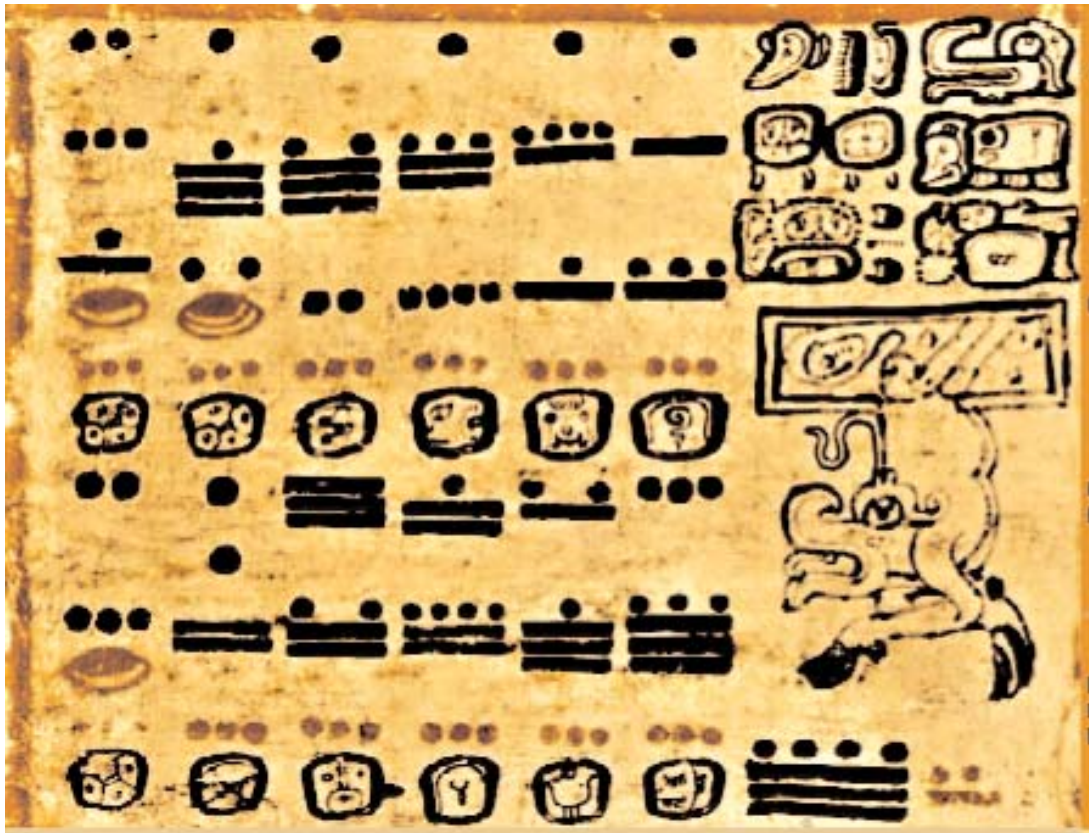
$$\ln(N) - k\ln(2) = H(p_1) + (1-p_1)\ln(N-1)$$

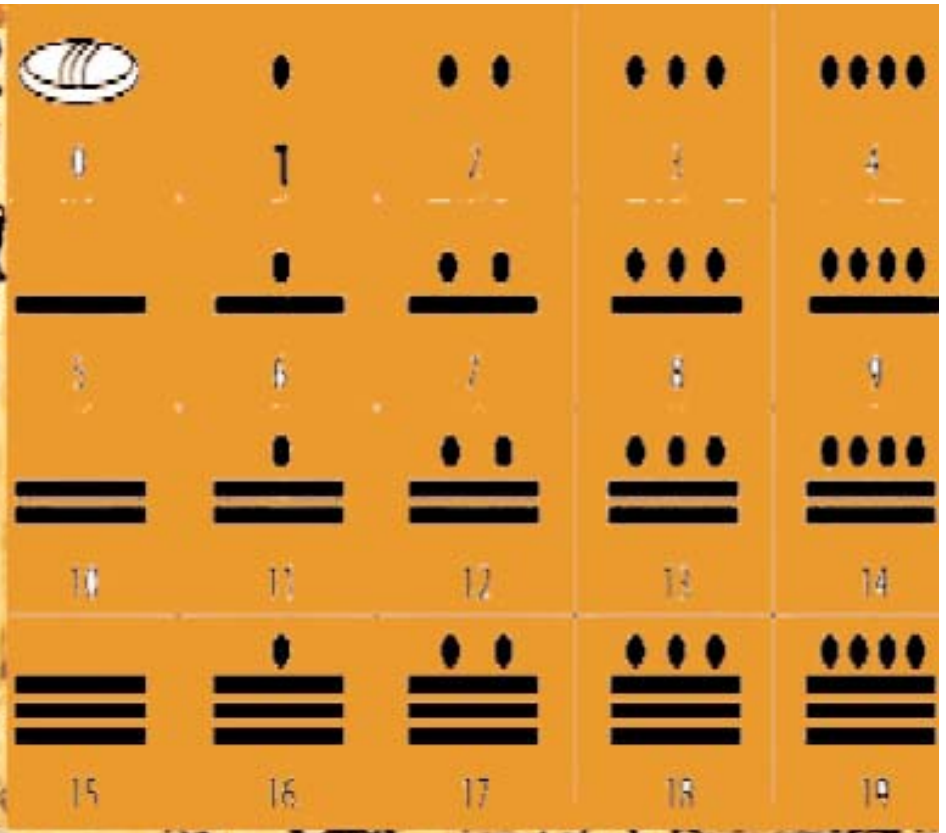
$$||\delta\hat{\rho}(\tau)|| \leq \frac{(\omega\tau)}{N}\left(||\hat{\sigma}|| + ||\hat{\rho}(t)|| + 2||\hat{\rho}(t)||\,||\hat{\sigma}||^2\right)$$

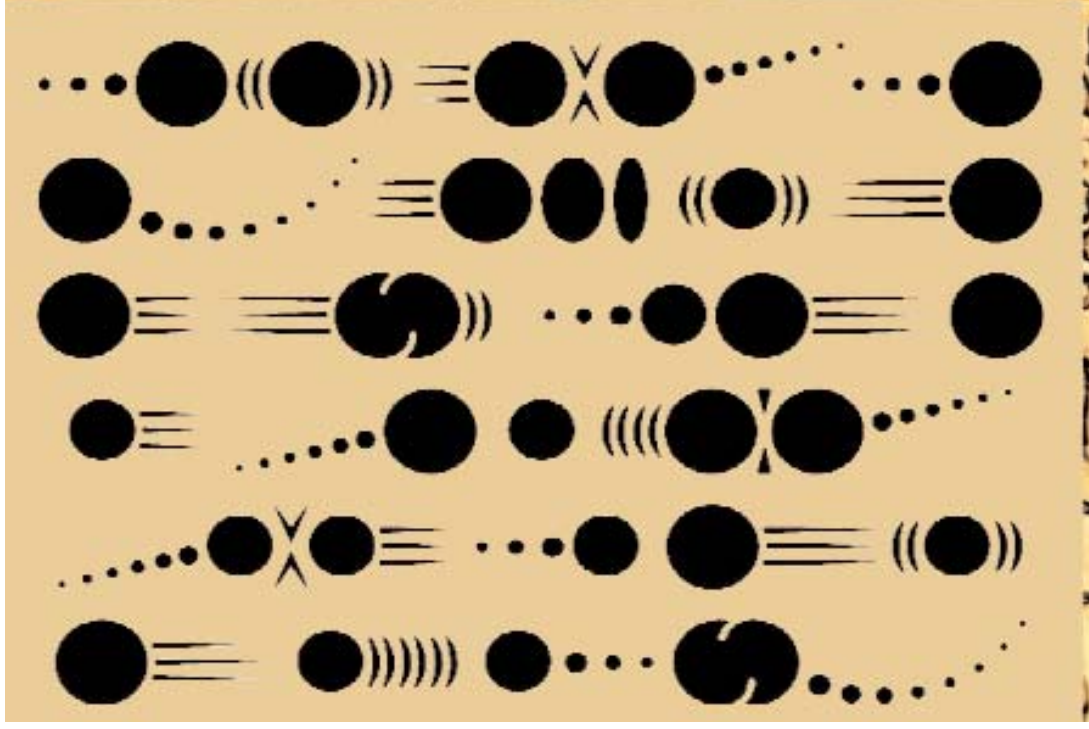
$$\rho \longrightarrow \Phi_{\delta t}[\hat{\rho}] = \cos^2(\omega\delta t)\hat{\rho} + \sin^2(\omega\delta t)\hat{\sigma}$$

$$-i\sin(\omega\delta t)\cos(\omega\delta t)\,[\hat{\sigma},\hat{\rho}]\,.$$

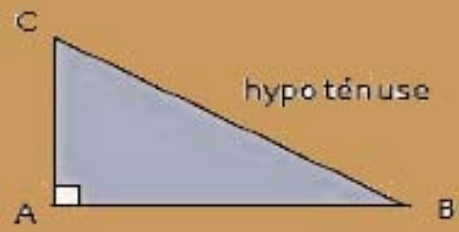





0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19



Théorème de Pythagore



Si le triangle ABC est rectangle en A alors $BC^2 = AB^2 + AC^2$

Exemple :

AB	AC	BC
2 cm	3 cm	?

$BC^2 = AB^2 + AC^2$

$BC^2 = 2^2 + 3^2$

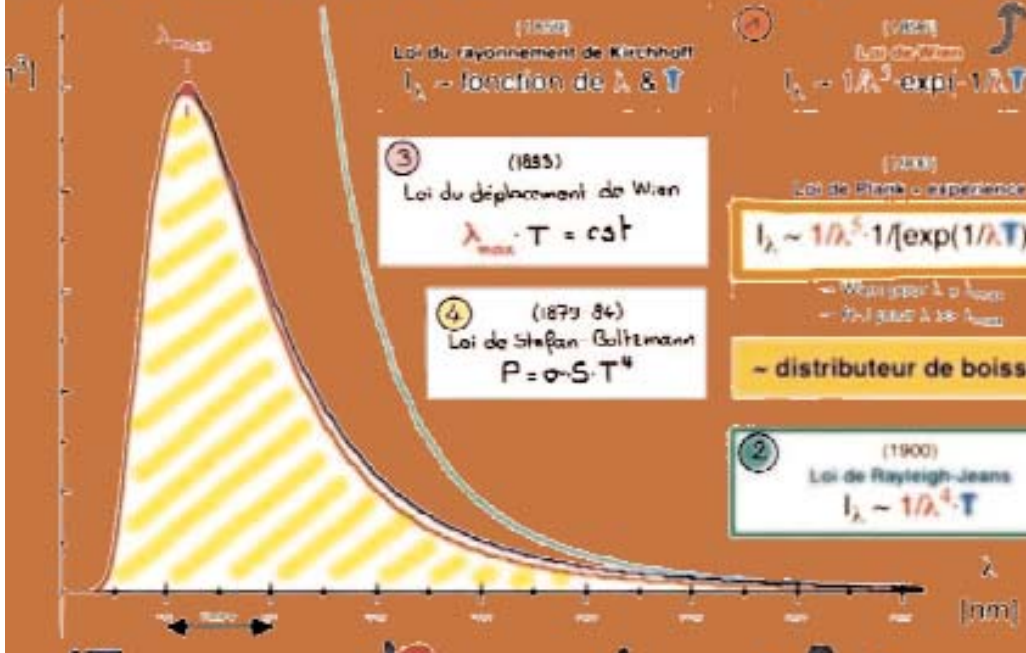
$BC^2 = 4 + 9$

$BC^2 = 13$

$BC = \sqrt{13}$ ← racine carrée de 13

$BC \approx 3{,}61$ cm

Incandescence



(1859)
Loi du rayonnement de Kirchhoff
I_λ = fonction de λ & T

(1864)
Loi de Wien
$I_\lambda \sim 1/\lambda^5 \cdot \exp(-1/\lambda T)$

(1893)
3 Loi du déplacement de Wien
$\lambda_{max} \cdot T = cst$

(1879-84)
4 Loi de Stefan-Boltzmann
$P = \sigma \cdot S \cdot T^4$

(1900)
Loi de Planck - expérience
$I_\lambda \sim 1/\lambda^5 \cdot 1/[\exp(1/\lambda T)-1]$

~ distributeur de boisson!

(1900)
2 Loi de Rayleigh-Jeans
$I_\lambda \sim 1/\lambda^4 \cdot T$

$I_\lambda = \frac{a}{\lambda^5} \cdot \exp\left(\frac{-b}{\lambda T}\right)$ (4)

V

Soit $x \equiv \frac{1}{\lambda T}$

I_λ de Pla

1 $\forall x \gg x_m$

$\frac{1}{e^x-1} \simeq \frac{1}{e^x}$ ca

$\rightarrow I_\lambda$ de W

2 $\forall x \ll x_M$

$\frac{1}{e^x-1} \gg \frac{1}{(1+x)-}$

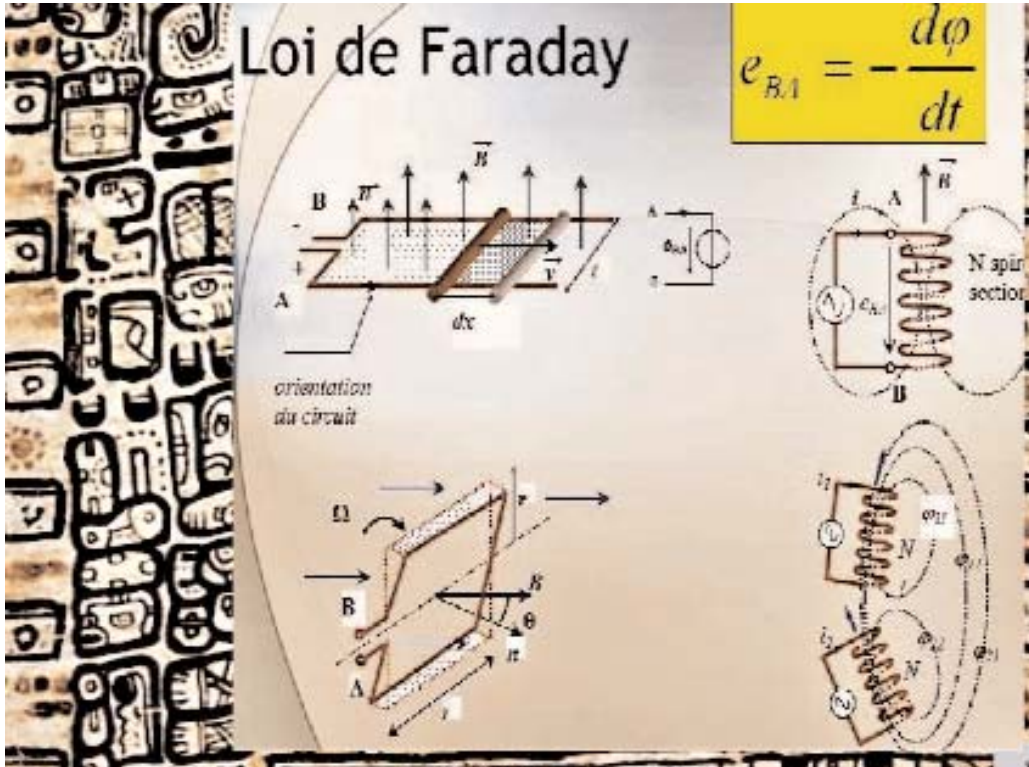
$\frac{1}{\lambda^5} \cdot \lambda T = T/\lambda^4$

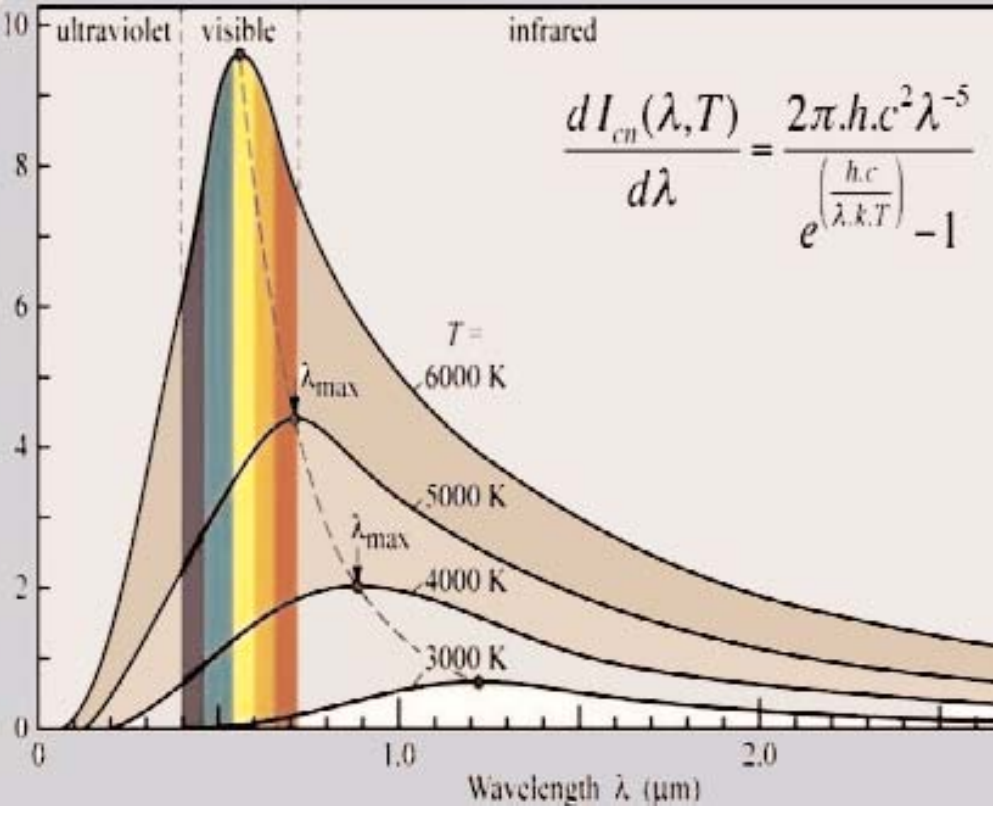
$\rightarrow I_\lambda$ de R

$\frac{dI_\lambda}{d\lambda} = 0 \Leftrightarrow \frac{d(\cdot)}{d\lambda} = \dots = \frac{1}{\lambda^5} \cdot \exp(\cdot)[\dots] = 0$

$\mapsto [-\frac{5}{x} + \frac{b}{T\lambda}] = 0 \mapsto \lambda T = b/5 = cst$ #

$\left[\frac{W}{m^2}\right]$ $\frac{P}{S} = \int I_\lambda d\lambda = \int \square d\lambda \dashrightarrow (\dots) \dashrightarrow \sigma$ #


Loi de Faraday
$e_{B,A} = -\frac{d\varphi}{dt}$
orientation
du circuit


ultraviolet
visible
infrared
$\frac{dI_{cn}(\lambda,T)}{d\lambda} = \frac{2\pi.h.c^2\lambda^{-5}}{e^{\left(\frac{h.c}{\lambda.k.T}\right)}-1}$
T =
6000 K
5000 K
4000 K
3000 K
λ_{max}
λ_{max}
0
2
4
6
8
10
0
1.0
2.0
Wavelength λ (μm)

The Mayan Calendar

The Maya calendar probably dates, in its final form, to the first century BC. J.-C. and it would be the product of the Olmec civilization. The calculation of the Mayan priests was so precise that the correction of their calendar is ten thousandth of a day more exact than the calendar currently in use in the world.

One of the calendar's most important roles was not to fix dates precisely in time, but to correlate the actions of Maya rulers with historical and mythological events. Deeds done by the gods during mythical days were recreated by Maya chiefs, often on the anniversary of the event - a date that was carefully calculated by Maya priests. The calendar was also used to designate the timing of past and future events. Some Mayan monuments, for example, record the dates of events that happened 90 million years ago, while others predict events that will take place 3,000 years later.

The calendar also predicted the future as is the case with our zodiac calendar. The Mayans believed, for example, that a person's date of birth or the sign under which they were born determined their fate during their lifetime. The newborn was therefore under the influence of a particular god throughout its existence. Some gods were more benevolent than others and a child born under good auspices was considered lucky. The child born under the influence of a less benevolent god was to curry favor with him all his life - especially during troubling times like the uayeb of the solar year.

Scholars have often wondered why the Mayan calendar was so complex. The reason for this is, in part, that it was up to the Maya priests to decide the dates of sacred events and the agricultural cycle. So it didn't matter that ordinary people understood the calendar, and the priests could make it hermetic at will.

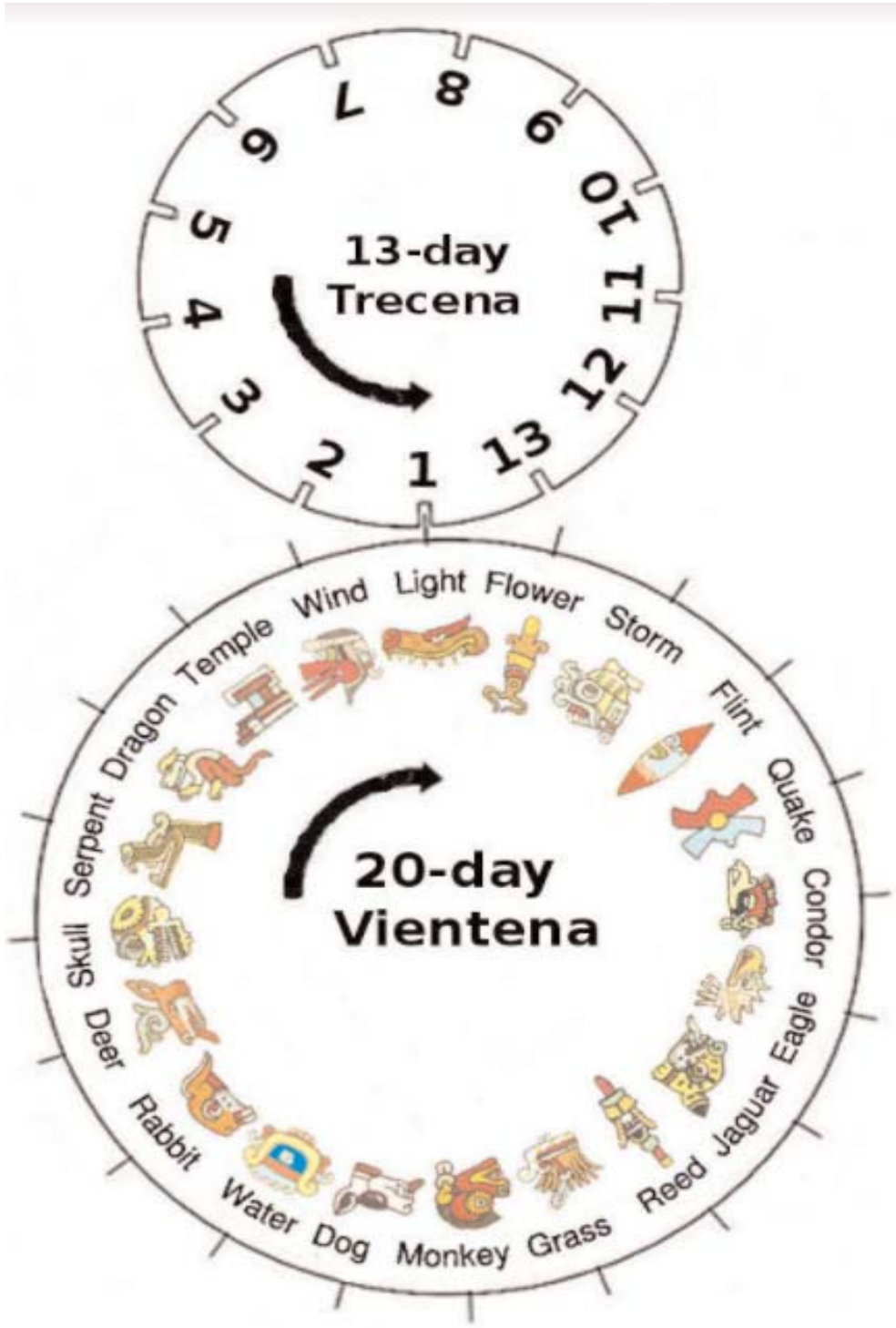
Astronomy

Of all the ancient calendars in the world, those of the Maya civilization and other Mesoamerican civilizations are the most complex and accurate. Calculations of the concordance between the Maya cycles of 260 days and 365 days give, in the tropics, results almost identical to those of the current solar year, the margin of error being only 19 minutes.

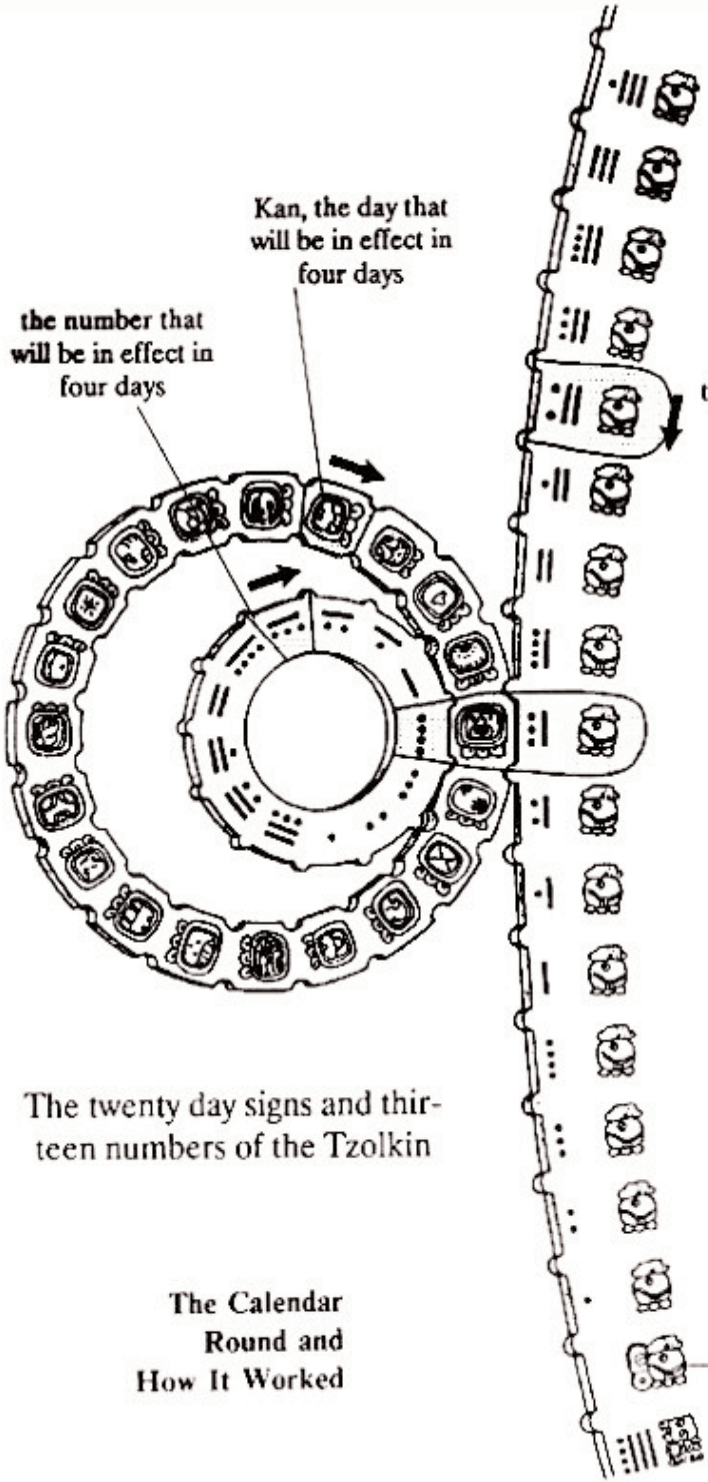
The Mayan astronomer-priests looked for signs in the heavens. To trace the complex movements of the sun, stars and planets, they had built observatories and gnomons measuring the cast shadows and they observed the horizon; from these observations, they made scholarly calculations and noted them in their chronicles or "codices". They then drew up calendars to record the movement of the stars and the passage of time. The Maya also kept detailed records of the phases of the moon without, however, formally recording this data in a lunar calendar.

The Maya also believed that the movements of the Sun and the Moon were, at each stage of their trajectory, guided by the gods. In their eyes, the Sun and the Moon, deep in the darkness of the night, continued to travel in the underground universe, under the threat of evil deities who wanted to curb their momentum. From there to believe that the celestial bodies had great need of men and their sacred rites such as self-mutilation, torture and human sacrifice, there was only one step. For them it was simply the price to pay for the survival of the universe. Death then became a privilege conferring immortality on the disappeared or on those who offered themselves in holocaust.

The repetitive cycles of creation and destruction described in Maya mythology served to remind humans of the importance of their obligations to the gods who ensured the survival of humanity and the price to pay for their failures. According to the sacred Maya calendar, each period of 52 years brought the threatens the destruction of the universe.

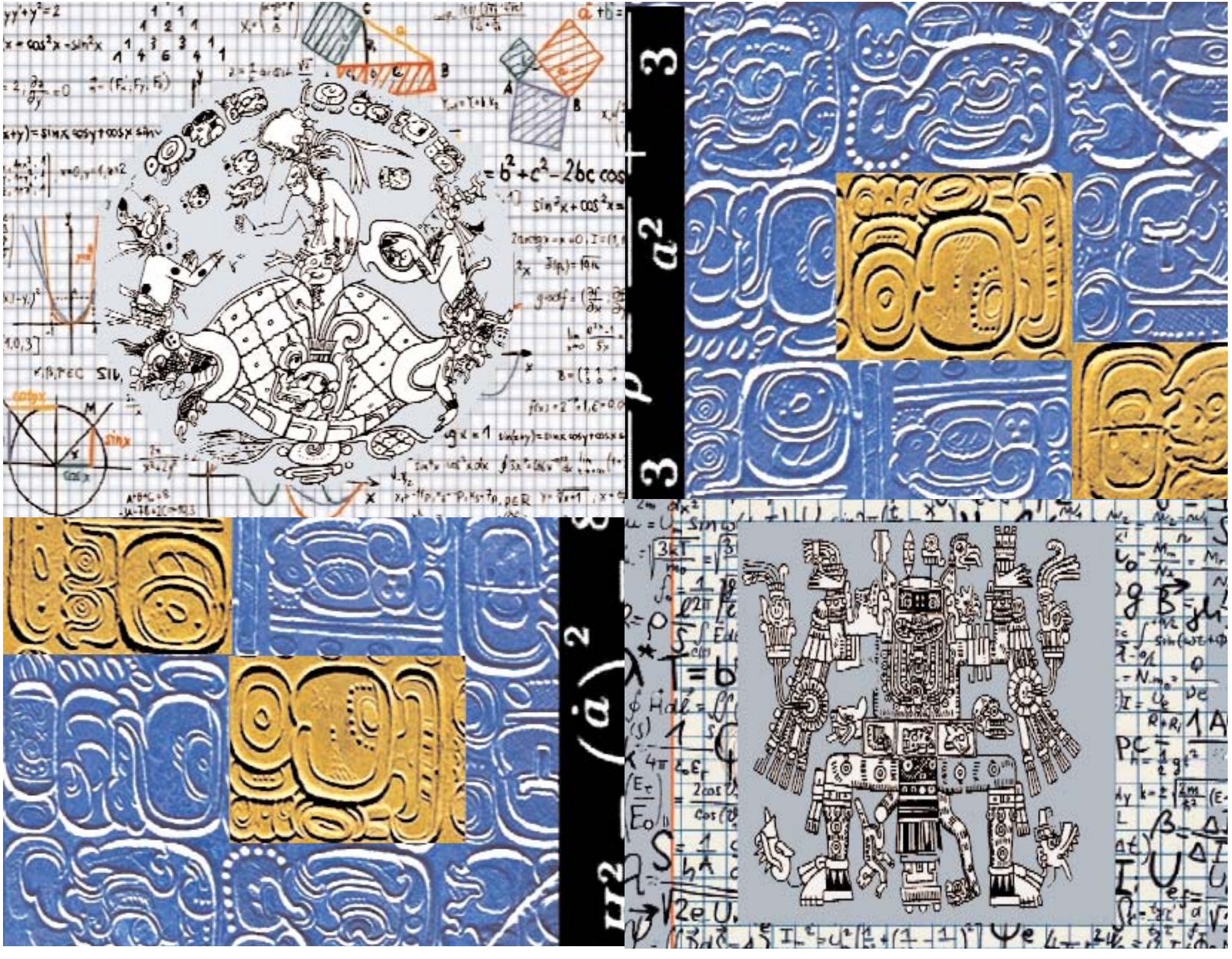


The Sacred Round


Kan, the day that will be in effect in four days
the number that will be in effect in four days
the Haab date that will be in effect in four days
4 Ahau 8 Cumku, the Calendar Round at the beginning of this era and every fifty-two years
The Haab, the 365-day Vague Year
seating of Cumku (the last day of Kayab)

The twenty day signs and thirteen numbers of the Tzolkin

The Calendar Round and How It Worked



The deities and the other forces of creation and chaos were then engaged in a merciless battle in the universe of mortals determining the fate of each of the creatures of this world.

The planet Venus had special significance to the Maya and Quetzalcoatl, for example, is currently identified with Venus. The Dresden codex, one of the four Maya chronicles that survived, also contains a detailed record of the appearances of Venus and was used to predict the future. The war itself was called from heaven, again by the planet Venus. On stelae and other carvings you can see Venus's insignia of war as raids and captures were settled by her appearances, especially in the form of the evening "star". Throughout Mesoamerica, the art of warfare was often tuned to the movements of Venus.

Mayan mythology, astrology and calendars were integrated into a single belief system. The Maya observed the sky and the calendars to predict solar and lunar eclipses, the cycles of the planet Venus and the movements of the constellations. These phenomena were not perceived as mechanical movements but as acts of the deities - mythical events recurring from Creation.

From the Maya culture to the present day there have only been immense evolutionary advances within the same conceptual framework.

The Westerner has forgotten which bifurcations he has gone through, to establish the culture that is his at the end of an "anti-magic polemic". The anthropologist must repair this oversight. This way of approaching things submits to analysis "not only the object [the magical world], but also the Western way of approaching it" To question the "reality" of magical powers is at the same time questioning what reality is for us. Whoever questions the "reality of magical powers" cannot be content with a denial, on the pretext that, in our culture, the anti-magical controversy has settled. Ethnology and humanism are therefore inseparable. Ethnology is then no longer conceived as the "science of cultures other than our own", but, fundamentally, as the "science of the relationship between us and other cultures". The essence of the problem is not to evaluate magical practices themselves
psychosocial measures intended to protect the "presence of man" in his world, the fundamental theme of his thought. "The overriding interest of the magical world is not to achieve particular forms of spiritual life, but to conquer and consolidate the "elementary" "being in the world" or "presence" of the person."

A historicist interpretation of magism (the magical world) must constitute itself as a real increase in our consciousness as historians, in general; it must therefore be ready and open to the conquest of new spiritual dimensions, as well as to a new articulation, even to the complete remodeling of the historical method in the light of new experiences.

It is in this spirit of openness and understanding that we must approach contemporary shamanism. From our distant origins, the interpretation of the ancient world has always been associated with shamanism through artistic expression. (Singing, dancing, drawing) According to R. Hamayon , the shaman's visions are not spontaneous physiological phenomena, but cultural and symbolic manifestations specific to the time of their expression. David S. Whitley , of the University of Los Angeles, established that the Native American shamans drew on the walls the visions which had appeared to them during their "dreams". His contact with the spirits gives the shaman special powers. The levels of the shamanic cosmos are accessible to shamans as they explore their altered states of consciousness to fulfill their various tasks. Access to their path of exploration is what anthropologists call "axis mundi ." These insights gained in altered states of consciousness become raw material for potential cultural use. In the past, in some communities, shamans would recount their experiences in tales, songs and myths ; sometimes they paint them on perishable materials like drum skins and clothing or on rock faces.

In the evening of May 1st, 1228, Venus was seen west close to horizon and in the north-western sky near Auriga (Aur). In the evening of December 7, 1228, Venus was seen west, and the same constellations were visible at the opposite direction, northeastern sky. A constellation 'Uiem' is named at both days.

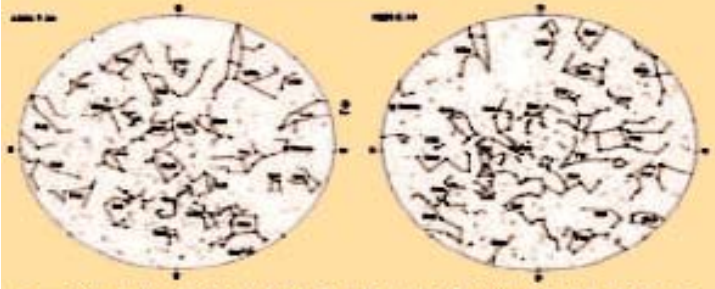


Figure 8. Venus and constellations on the sky in the evening of July 30, 1228, and in the morning of August 14, 1229, in the evening of July 30, 1228, Venus was west and the region near Aquarius (Aqr) and Pegasus (Peg) appears at the opposite direction, east. In the morning of August 14, 1229 Venus was east, and the same region was at the opposite direction, west (besides the part near the north celestial pole). A constellation 'Xiuw' is named at both days.

Figure 9. In the morning of April 6, 1230 Venus was at east near from horizon, and the region near Aquarius (Aqr), Pegasus(Peg), and Pisces Australis (PsA) was visible at the southeast direction. In the morning of August 22, 1229 Venus was visible still at east, but the same region was at the opposite direction, west and southwest (besides the part near the north celestial pole). A constellation 'Chak?' is named at both days.

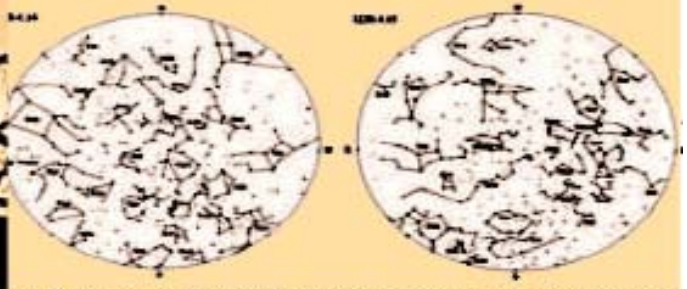
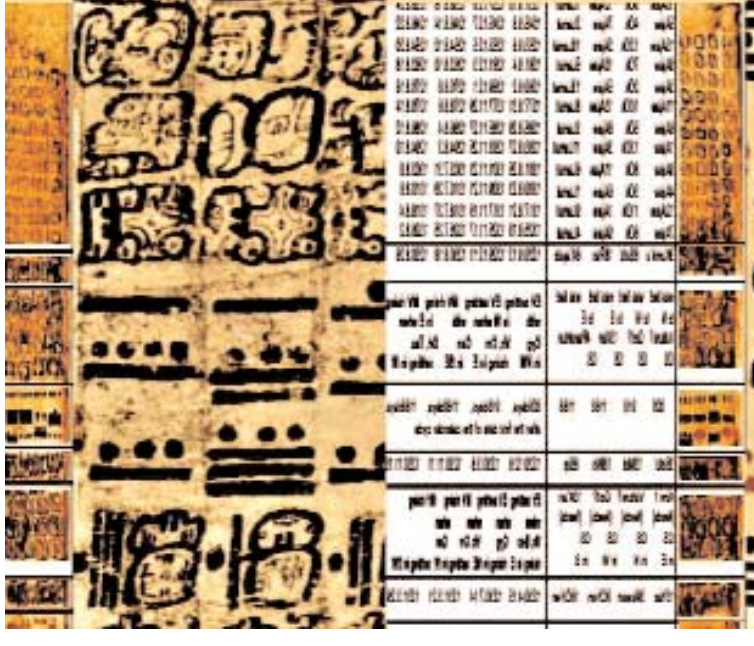
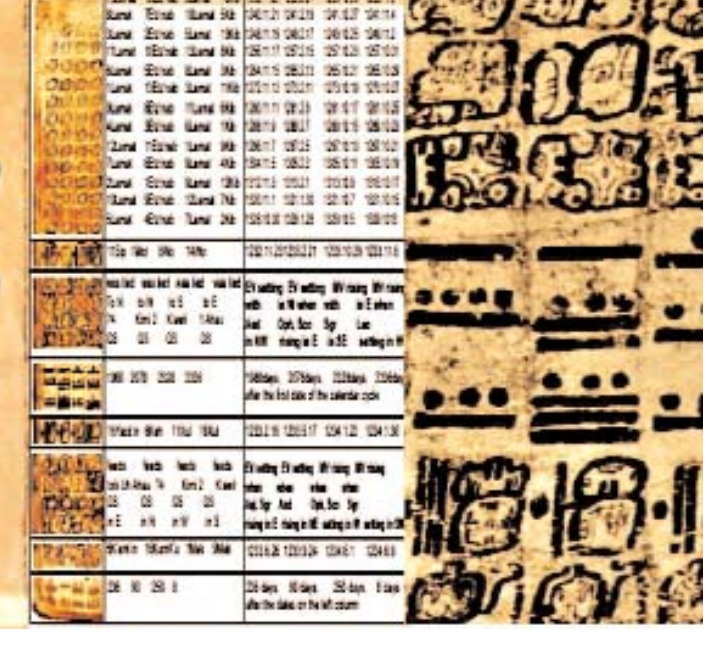


Figure 10. Mayan constellation map in the equatorial coordinate system. Hammer-Aitoff projection (Calabretta & Greisen 2002) of the whole sky. Plotted are 4,134 stars brighter than the visual magnitude of 5.5. Stars are connected to show the modern constellations. Constant declination and right ascension lines are drawn at every 10 and 20-degree intervals, respectively. Names mark the locations of twenty Mayan constellations.

Figure 11. Venus and constellations on the sky in the morning of April 14, 1229, and in the evening of April 15, 1230 appearing at page 46 and 47. In the morning of April 14, 1229, Venus was east near from horizon, and the region near Virgo (Vir) and Bootes (Boo) was at the opposite direction, west. In the evening of April 15, 1230, Venus was at west, the region near Virgo (Vir) and Bootes (Boo) was at the opposite direction, east. A constellation 'Xiuw' is named at both days.

We have allocated the specific part of the sky corresponding to each Maya constellation name in terms of the modern constellations. The final results are ted in Table 1. There is one Mayan constellation named twice, which we have tinguished from each other as Kimi-1 and Kimi-2. They are identified with rgo-Bootes and Ophiucus-Scorpius, respectively. Even though their separation

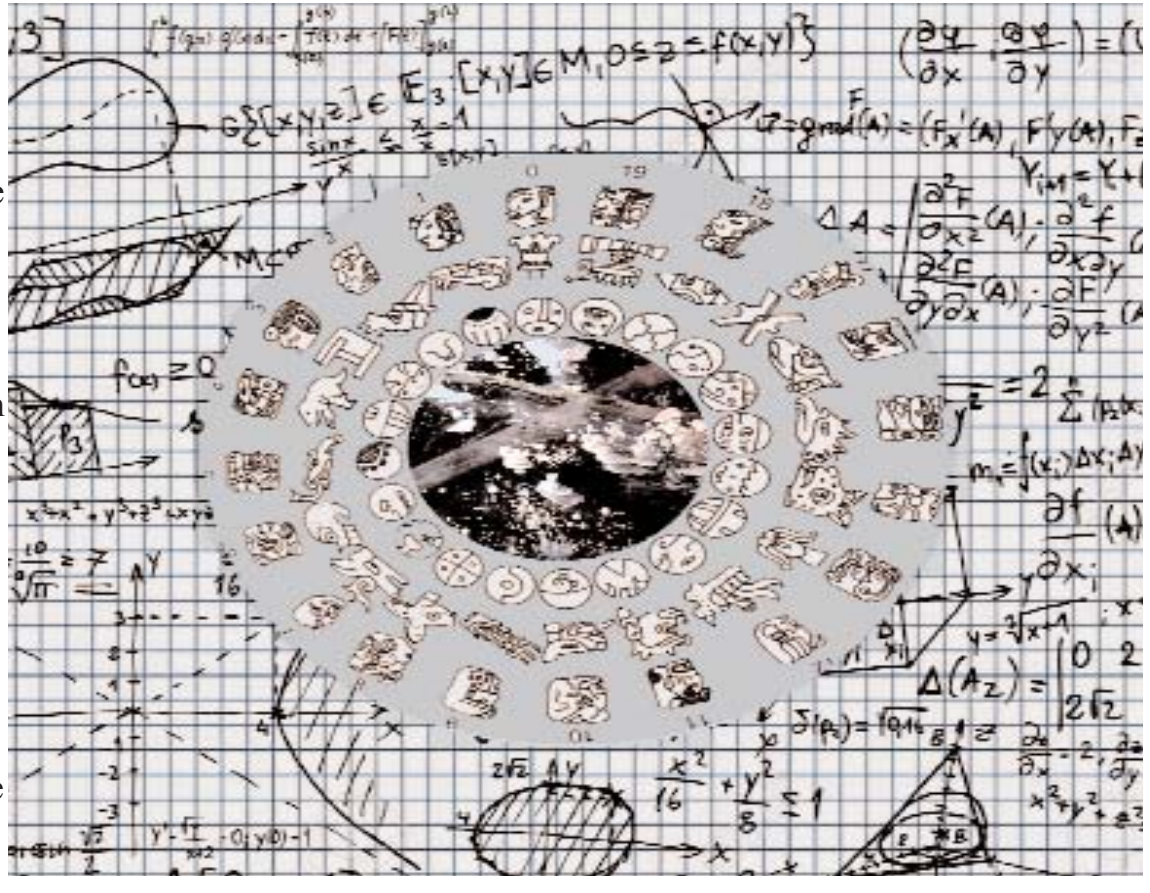


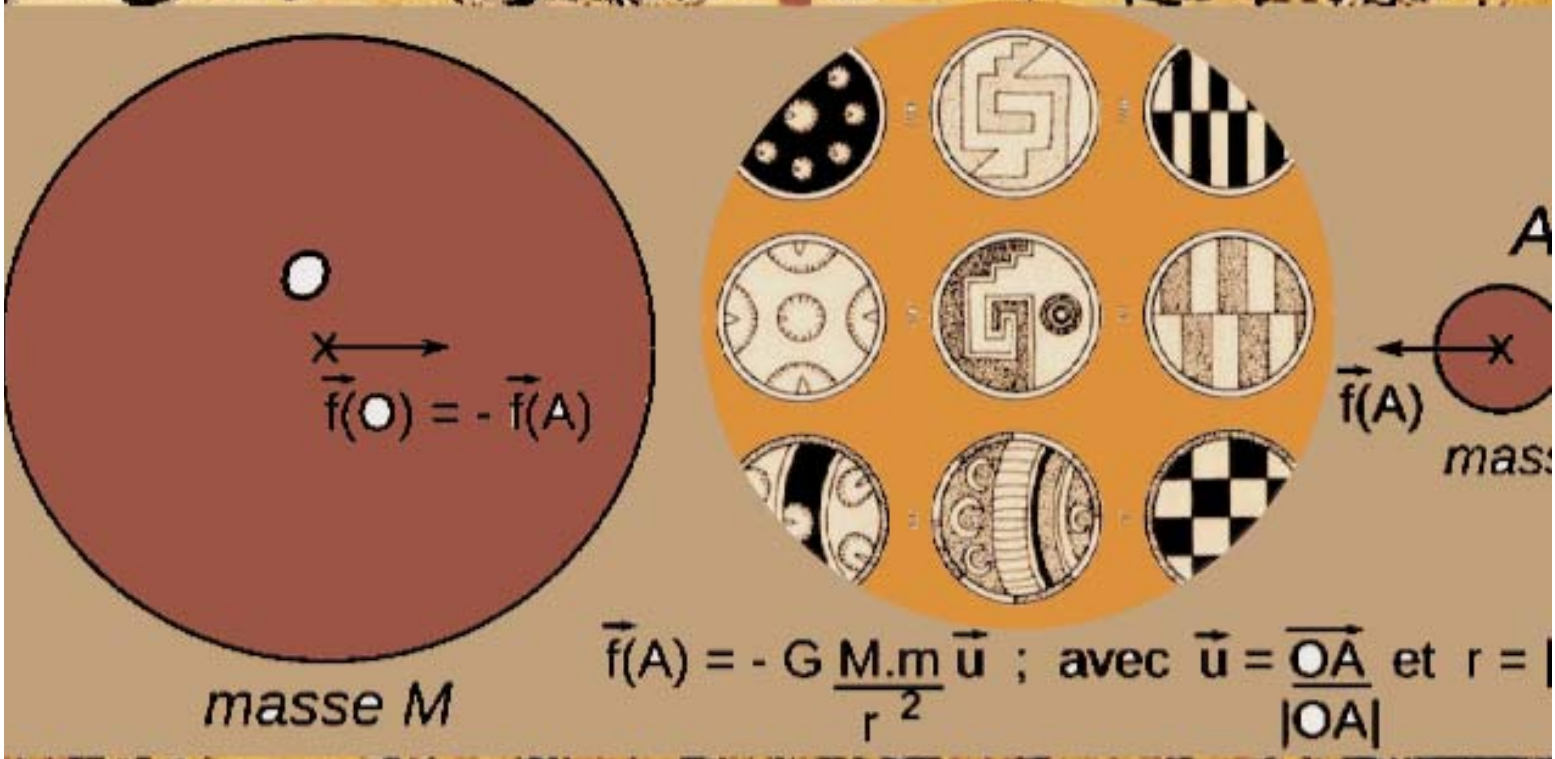


Because science and mathematics are really part of the "visual assets" of our society and perhaps even the most dominant. Quantum science with its quasi-mystical equations bear witness to this relief. The way in which the magic role acts comes mainly from the forces it sets in motion. Where there is science there is also magic and mystery. It is certain that part of the sciences were elaborated, especially in primitive societies, by magicians. The magician alchemists, the magician astrologers, the magician doctors were, in Greece, as in India and elsewhere, the founders and workers of astronomy, physics, chemistry, natural history and mathematics. This treasure of ideas, amassed by magic, has long been the capital that the sciences have exploited. Magic nourished science and magicians supplied scholars.

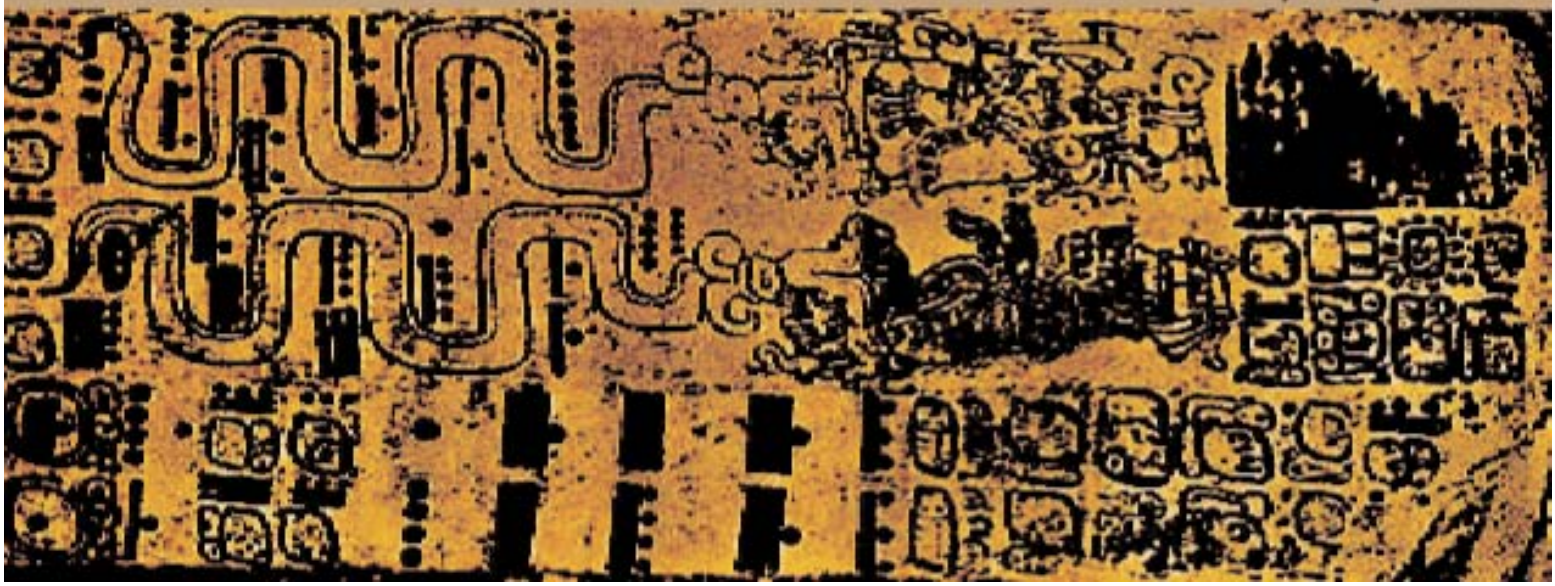
The modern scientist, who interprets the Universe, life and of course humans as a set of complex physical, chemical and physiological mechanisms has enabled him to draw astonishing conclusions, so astonishing that they are incomprehensible. More and more, quantum logic realizes that there are potentially observable attributes in the Universe but which have such a sum of paradigms that they are incalculable. Welcome to the world of magic. There are therefore until now two incomplete ways of approaching the Universe: Reason and Intuition.

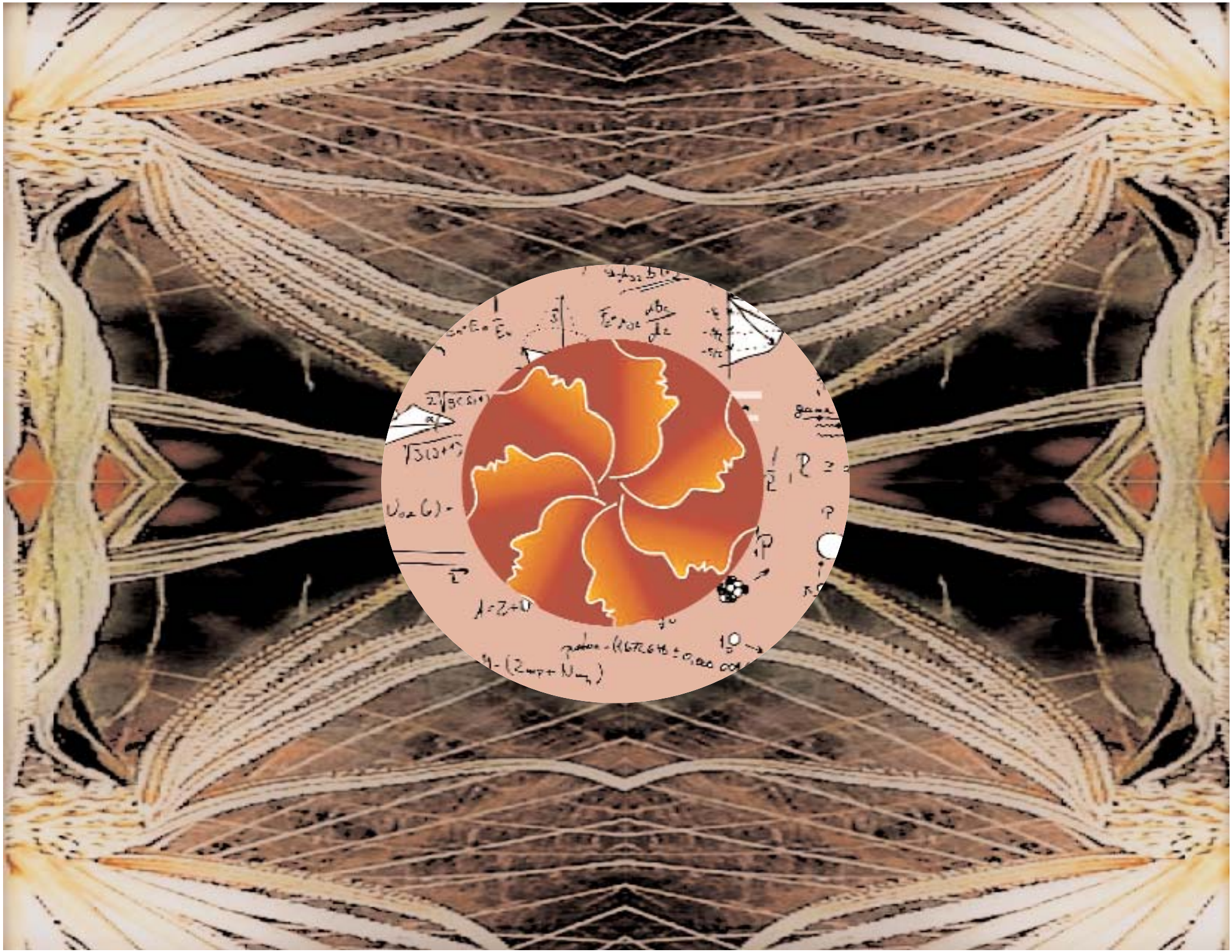
We can even affirm that Intuition comes to the aid of broken down Reason, as if to "know" the Universe, our conscience also asks us to "feel" the Universe. We then think of two logical systems which confront each other when this is not the case, on the contrary: the paradoxical language of Intuition versus Reason takes nothing away from knowledge. The alliance between intuition and reason subsequently led to the science of probability and the emergence of quantum equations. Except that from equation to equation, physicists have come up against the inexplicable. The image of the Universe provided as much by Intuition (primordial sensation) as by Reason (primordial information) propels us into a random and symbolic world. And magic comes to the aid of reason by
breakdown . So what is magic? Any attempt to explain the visible world by unpredictable forces like quantum probability is magic, like attempting an intuition-based explanation of the world like rock art. Unfortunately, we have always sought to oppose reason and intuition, science and art when they are complementary from the point of view of the acquisition of knowledge. We are crossed by mysteries as neutrinos cross matter. Both prehistoric frescoes, Sumerian astronomy and Mayan mathematics and contemporary quantum equations are embedded in a space of magical consciousness that quantum physics rationally attempts to observe and interpret without success. If the cosmos is magical then we are indeed quantum primitives.

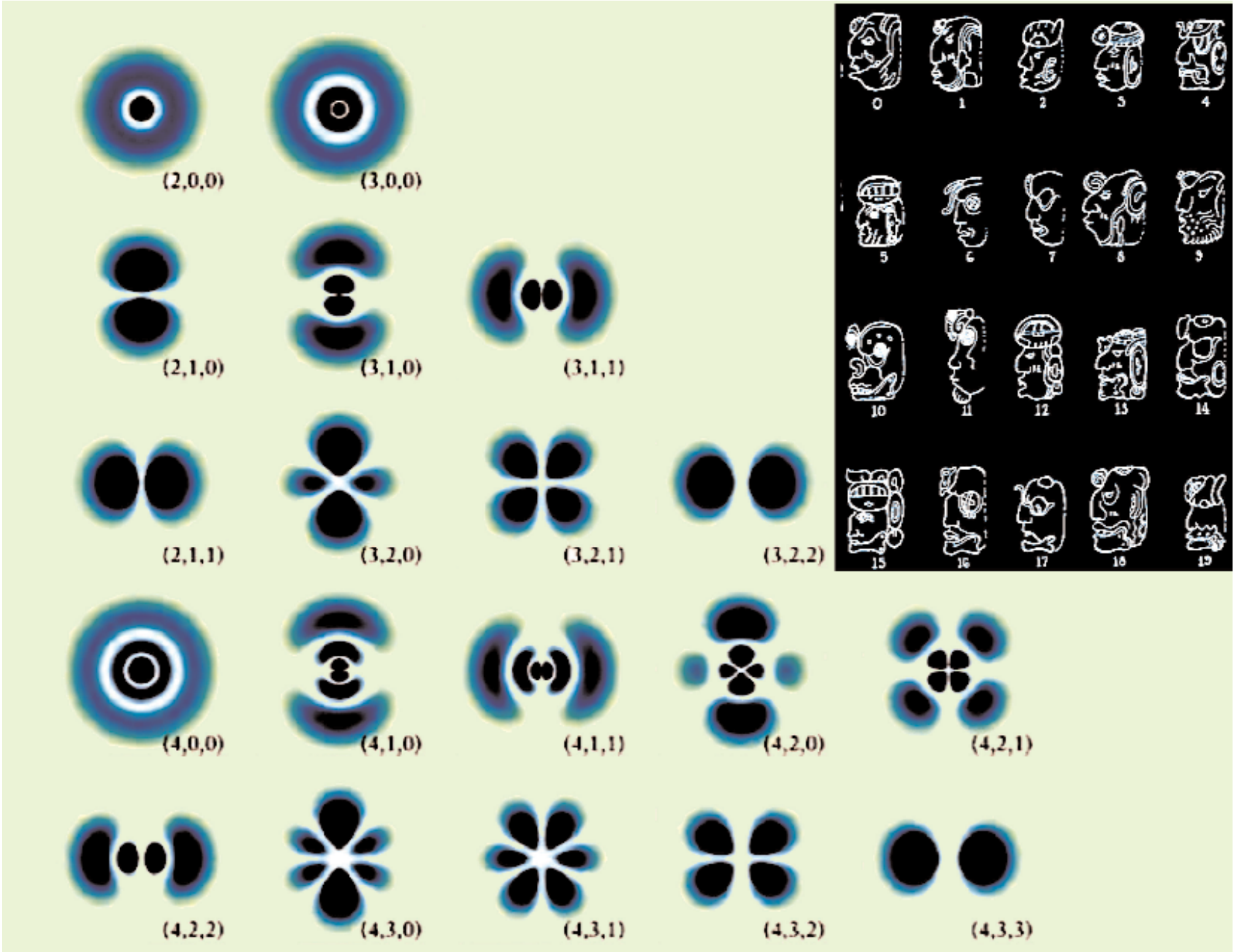


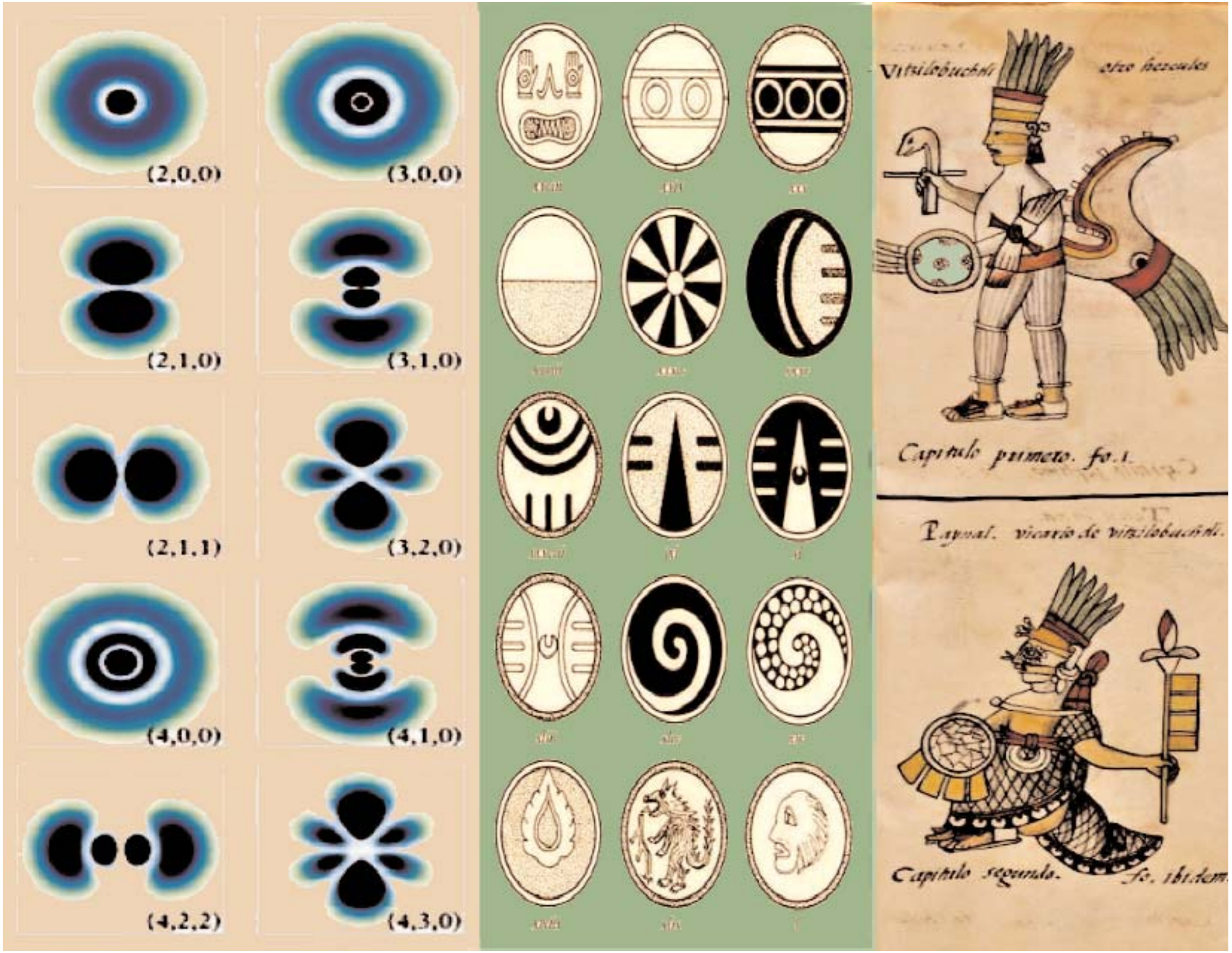


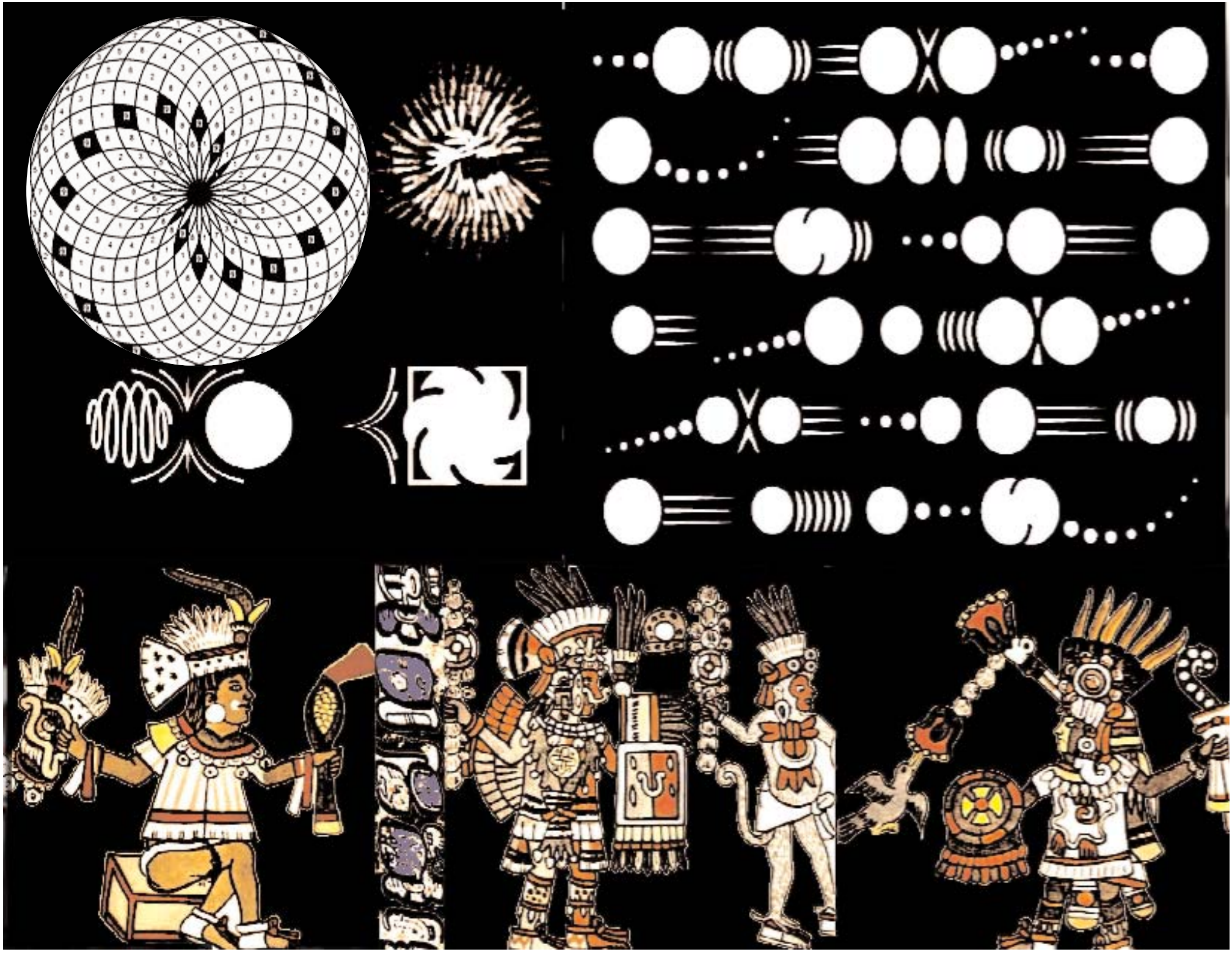
$$\vec{f}(A) = -G\frac{M.m}{r^2}\vec{u} \quad ; \quad \text{avec } \vec{u} = \frac{\overrightarrow{OA}}{|OA|} \text{ et } r = |$$






(2,0,0)
(3,0,0)
(2,1,0)
(3,1,0)
(3,1,1)
(2,1,1)
(3,2,0)
(3,2,1)
(3,2,2)
(4,0,0)
(4,1,0)
(4,1,1)
(4,2,0)
(4,2,1)
(4,2,2)
(4,3,0)
(4,3,1)
(4,3,2)
(4,3,3)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19


(2,0,0)
(3,0,0)
(2,1,0)
(3,1,0)
(2,1,1)
(3,2,0)
(4,0,0)
(4,1,0)
(4,2,2)
(4,3,0)
Vitzilobuchtli otro huesudo
Capitulo primero. fo.1.
Tapual. vicario de vitzilobuchtli.
Capitulo segundo. fo. ibidem



E= m c2